

## PATENT ABSTRACTS OF JAPAN

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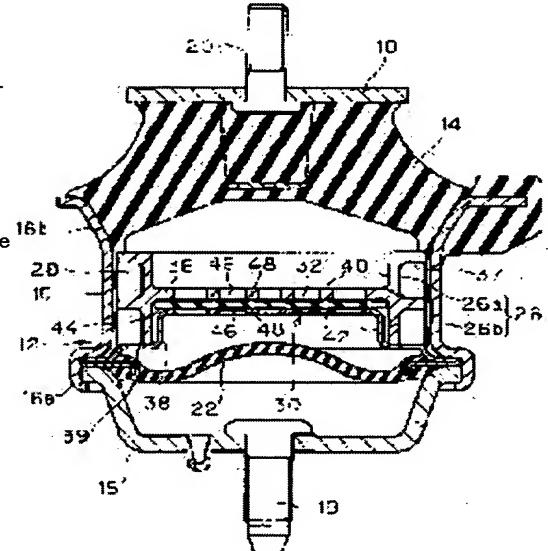
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**(54) FLUID FILLING-IN VIBRATION-RESISTANT DEVICE****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide a vibration-resistant device preventing a filled liquid from unnecessarily leaking out between through-holes of a partitioning member and improving vibration-resistant performance.

**SOLUTION:** The vibration-resistant device is provided with a first installing member 10 and a second installing member 12 which are combined each other via a vibration-resistant base body 14 formed by a rubber material, a fluid filling-in chamber 26 arranged between a diaphragm 22 mounted on the installing member 12 and the vibration-resistant base body 14 which is partitioned into two chambers by a partitioning member 30, and two chambers 26a and 26b connected each other by an orifice 28. The partitioning member 30 comprises an elastic film 32 partitioning two chambers 26a and 26b, and a pair of lattices 40 and 42 restricting displacement of the elastic film 32. A projected ridge 48 surrounding the whole through-holes 46 at the whole periphery is integrally arranged on the surface of the elastic film 32. A movement of fluid between adjacent through-holes is controlled by making the projected ridge 48 connected with the lattices 40 and 42.

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CLAIMS

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## [Claim(s)]

[Claim 1] The vibrationproofing base which consists of the 1st attachment member, the 2nd attachment member which has a tubed drum section, and rubber material which is interposed between these attachment members and combines both the attachment member, The diaphram which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphram in the inside of said 2nd attachment member, The batch member which forms the orifice passage which it is attached [ passage ] in the inner circumference of said 2nd attachment member, and said fluid enclosure room is divided [ passage ] into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphram, and makes the periphery section open the 1st room and the 2nd room for free passage, The elastic membrane into which a preparation and said batch member divide the 1st aforementioned room and the 2nd room, It comes to have the part I material allotted to the vibrationproofing base side about this elastic membrane, and the part II material which presses the periphery section of said part I material in the fluid enclosure room side periphery section of said vibrationproofing base by it being allotted to a diaphram side about said elastic membrane, and caulking immobilization of the periphery section being carried out at said 2nd attachment member. While preparing the crevice for holding said elastic membrane in the aforementioned part I material or the part II material The fluid filled system vibration isolator characterized by what the flat-surface section which contacts an opening end face was prepared so that opening of this crevice might be plugged up on another side, and the clearance which restricts the variation rate of said elastic membrane between said part I material and part II material was formed for.

[Claim 2] The fluid filled system vibration isolator according to claim 1 characterized by forming the aforementioned part I material and the aforementioned part II material with a heterogeneous ingredient.

[Claim 3] The fluid filled system vibration isolator according to claim 2 characterized by having established said crevice in said part I material, having formed this part I material with resin, having prepared said flat-surface section in said part II material, and forming this part II material with a metal.

[Claim 4] The fluid filled system vibration isolator according to claim 1 to 3 characterized by positioning said part I material and part II material in a hand of cut by inserting in the hole which said part I material equips the periphery section with the wall which intercepts the flow to the hoop direction of said orifice passage, extended the tip of this wall, and prepared this extension in said part II material.

[Claim 5] The fluid filled system vibration isolator according to claim 4 characterized by having prepared the hook in the extension of said wall and hooking this hook on the opening edge of said hole.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fluid filled system vibration isolator used for mainly supporting oscillating objects, such as an automobile engine, in vibrationproofing.

[0002]

[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine, The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphragm is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphragm, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphragm by the batch member. It is constituted so that it may make it come to be open for free passage of both \*\* with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.

[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid-like member of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.

[0004] About this kind of vibration isolator, what constituted the grid from an orifice member of the vertical pair which forms orifice passage in the periphery section in preparation for a center section, and elastic membrane held between both orifice members as a batch member into which an up-and-down liquid room is divided is indicated by JP,6-221368,A. In this vibration isolator, fitting of the orifice member which consists of the same ingredient was carried out, in order to set up orifice passage and the movable clearance between elastic membrane and to raise fitting precision, the fitting side had to be cut or dimensional accuracy of the movable clearance between elastic membrane had to be sacrificed. That is, when having set up the clearance dimension at the time of combining, therefore combining the large components of especially manufacture tolerance by each dimension setup in the orifice member of the upper and lower sides which fit in in this case, it was not easy to secure the dimensional accuracy of a movable clearance.

[0005] This invention is made in view of the above point, and aims at improving the dimensional accuracy of the movable clearance for the elastic membrane in a batch member.

[0006]

[Means for Solving the Problem] The 2nd attachment member in which the fluid filled system vibration isolator of this invention has the 1st attachment member and a tubed drum section, The vibrationproofing base which consists of rubber material which is interposed between these attachment members and combines both the attachment member, The diaphragm which was made to counter said vibrationproofing base and was attached in said 2nd attachment member, The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphragm in the inside of said 2nd attachment member, The batch member which forms the orifice passage which it is attached [ passage ] in the inner circumference of said 2nd attachment member, and said fluid enclosure room is divided [ passage ] into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphragm, and makes the periphery section open the 1st room and the 2nd room for free passage, The elastic membrane into which a preparation and said batch member divide the 1st aforementioned room and the 2nd room, It comes to have the part I material allotted to the vibrationproofing base side about this elastic membrane, and the part II material which presses the periphery section of said part I material in the fluid enclosure room side periphery section of said vibrationproofing base by it being allotted to a diaphragm side about said elastic membrane, and caulking immobilization of the periphery section being carried out at said 2nd attachment member. While preparing the crevice for holding said elastic membrane in the aforementioned part I material or the part II material, the flat-surface section which contacts an opening end face is prepared so that opening of this crevice may be plugged up on another side, and the clearance which restricts the variation rate of said elastic membrane between said part I material and part II material is formed.

[0007] The dimension is prescribed by the depth of the crevice which established the movable clearance for elastic membrane in the part I material or the part II material in the batch member which forms orifice passage in the periphery section as it is the vibration isolator of this invention, namely, the dimension which regulates the variation rate of elastic membrane — the part I material or the part II material — it can set up only by the side. Therefore, the dimensional accuracy of a movable clearance can be improved compared with the case where a dimension setup is carried out with both combination. Close dimensional accuracy is called for also about the movable clearance between elastic membrane by the advancement of the military requirement of the latest car, and if it is this invention, it can respond cheaply in simple combination to such a demand.

[0008] In the vibration isolator of this invention, the part I material and the part II material can be formed with a heterogeneous ingredient, and by establishing the above-mentioned crevice in the small member of manufacture tolerance in that case, while is accurate and they can set up a movable clearance only by the member.

[0009] For example, said crevice is established in said part I material, this part I material may be formed with resin, said flat-surface section may be prepared in said part II material, and this part II material may be formed with a metal. In this case, about the part II material which carries out caulking immobilization, the reinforcement which is equal to a caulking is securable by forming with metals, such as a press steel plate and an aluminum cast. On the other hand, the dimensional accuracy of a movable clearance can be secured about the part I material which performs a dimension setup of a movable clearance, without carrying out cutting by forming by resin with sufficient dimensional accuracy. Moreover, lightweight-ization can also be attained by forming by resin.

[0010] As for the part I material and the part II material, in the vibration isolator of this invention, constituting so that it may not contact

fundamentally is desirable by parts other than the contact section of the above-mentioned flat surface section and a crevice opening end face. However, in order to position both a hand of cut, the part may touch.

[0011] For example, when the part I material equips the periphery section with the wall which intercepts the flow to the hoop direction of said orifice passage, the tip of this wall may be extended and you may insert in the hole which prepared this extension in the periphery section of said part II material. In this case, the part I material and the part II material can be positioned in a hand of cut by applying an extension to the opening edge of the above-mentioned hole. Moreover, since the wall is extended to the part II material side in this case, leak of a fluid [ \*\*\*\* / from between the tip of a wall and the part II material / un- ] can also be prevented by this extension.

[0012] Moreover, a hook may be prepared in the extension of said wall, this hook may be hooked on the opening edge of said hole, and, thereby, omission prevention with the part I material and the part II material at the time of manufacture and rotation prevention are attained.

[0013]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0014] Drawing 1 is drawing of longitudinal section of the fluid filled system vibration isolator concerning 1 operation gestalt of this invention. This vibration isolator comes to join together the 1st fixing metal 10 attached in an oscillating generating object side, such as an engine, and the 2nd fixing metal 12 which has the tubed drum section by which attachment immobilization is carried out at the support side of a car-body frame etc. through the vibrationproofing base 14 which consists of rubber material.

[0015] The 2nd fixing metal 12 consists of tubed metallic ornaments 16 and bottom metallic ornaments 18 concluded by the lower limit 16a with the caulking means, and the bolt 19 for attachment protrudes on the bottom metallic ornaments 18.

[0016] The 1st fixing metal 10 is the plate-like part material which set necessary spacing to the axial center section upper part of the 2nd fixing metal 12, and was allotted to it, and the bolt 20 for attachment protrudes on the center section towards the upper part.

[0017] The 1st fixing metal 10 fixed [ the appearance ] the abbreviation truncated cone form with the vulcanization shaping means on nothing and its top face, and the upper limit section of the 2nd fixing metal 12 has fixed the vibrationproofing base 14 with the vulcanization shaping means in the lower limit periphery section. In the case of drawing, diameter expansion formation of the upper limit section 16b of the tubed metallic ornaments 16 is carried out at the shape of a taper, and vulcanization adhesion of the lower periphery of the vibrationproofing base 14 is carried out at this upper limit section 16b. Thin film rubber section 14a installed in the shape of a thin film from the vibrationproofing base 14 is prepared in the internal surface of the 2nd fixing metal 12.

[0018] The lower part side of the 2nd fixing metal 12 is equipped with the diaphragm 22 which consists of rubber membrane so that it may counter with the vibrationproofing base 14. Diaphragm 22 equips the periphery section with the ring-like reinforcement metallic ornaments 24, and it is attached in the 2nd fixing metal 12 by these reinforcement metallic ornaments 24 making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0019] Inside the 2nd fixing metal 12, the fluid enclosure room 26 sealed between diaphragm 22 and the vibrationproofing base 14 is formed, and the liquid as a fluid is enclosed with this fluid enclosure room 26. the disc-like batch member 30 which has the orifice passage 28 at a periphery in the inner circumference of the 2nd fixing metal 12 in the fluid enclosure room 26 — liquid — it is attached densely. The fluid enclosure room 26 is divided into 1st room 26a by the side of a vibrationproofing base, and 2nd room 26b by the side of diaphragm by this batch member 30, and both \*\* 26a and 26b are made open for free passage by the orifice passage 28.

[0020] The batch member 30 consists of the disc-like rubber membrane 32 as valve portion material which divides 1st room 26a and 2nd room 26b, a top member 34 allotted to the vibrationproofing base 14 side about rubber membrane 32, and a bottom member 36 allotted to the diaphragm 22 side about rubber membrane 32.

[0021] With this operation gestalt, the top member 34 is the mold Plastic solid of resin (for example, PPA (poly phthalamide)), and as shown in drawing 2 , it consists of central shelf 34a which is faced and allotted to the top face of rubber membrane 32, and restricts the variation rate to the upper part, and periphery section 34b equipped with the slot 38 for forming the orifice passage 28. Periphery section 34b makes approximate circle tubed, and is equipped with the slot 38 which extends over 2 rounds of upper and lower sides in a hoop direction in the peripheral face. And let space surrounded by this slot 38 and thin film rubber section 14a of the vibrationproofing base 14 be the orifice passage 28. The opening 40 which makes the orifice passage 28 and 1st room 26a open for free passage because some upper walls cut and lack is formed in periphery section 34b.

[0022] It is built over central shelf 34a of the top member 34 so that the interior of cylinder-like periphery section 34b may be divided up and down in a shaft-orientations center section, therefore it is making disc-like. Central shelf 34a is formed in the shape of a grid, and is equipped with two or more through tubes 42 formed of this grid. The crevice 44 for holding rubber membrane 32 is established in the field of the side which counters the inferior surface of tongue 32 of central shelf 34a, i.e., rubber membrane. The even opening end face 46 which makes the shape of a ring is secured in the perimeter of a crevice 44.

[0023] Disc-like central shelf 36a which the bottom member 36 is the press-forming object of a metal plate with this operation gestalt, is faced and allotted to the inferior surface of tongue of rubber membrane 32, and restricts the variation rate to the lower part. It consists of periphery section 36b by which is made to go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization is carried out in the section, and while forming the orifice passage 28 with periphery section 34b of the top member 34 between central shelf 36a and periphery section 36b, step 36c is formed. The bottom member 36 is pressed by carrying out caulking immobilization of the periphery section 36b to level difference section 14b in which the upper limit side of periphery section 34b of the top member 34 was established by the bottom periphery section of the vibrationproofing base 14.

[0024] Central shelf 36a of the bottom member 36 is projected and prepared in the upper part from inside step 36c, and it is allotted inside [ lower ] periphery section 34b so that phase opposite may be carried out with central shelf 34a of the top member 34. Central shelf 36a of the bottom member 36 is the flat-surface section which contacts the opening end face 46 so that opening of the crevice 44 of the top member 34 may be plugged up, and it does not have a crevice for holding rubber membrane 32 like the top member 34. Therefore, by pressing central shelf 36a of the bottom member 36 to the opening end face 46 of the crevice 44 of the top member 34 by the above-mentioned caulking immobilization, as shown in drawing 2 (c), between the top member 34 and the bottom member 36, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed, and the dimension X of this clearance 48 is prescribed by only the depth of a crevice 44.

[0025] In addition, central shelf 36a of a bottom member is formed in the shape of [ the / as central shelf 34a of the top member 34 / same ] a grid, and is equipped with two or more through tubes 50 formed of this grid. Moreover, the opening 52 which makes the orifice passage 28 and 2nd room 26b open for free passage is formed in inside step of bottom member 36 36c.

[0026] Rubber membrane 32 is allotted to the above-mentioned clearance 48, and the variation rate of the vertical direction is restricted between up-and-down central shelf 34a and 36a, the dimension X of a clearance 48 is greatly set up a little rather than the thickness of rubber membrane 32 — having — \*\*\*\* — thereby — vertical movement of rubber membrane 32 — the variation rate is made possible.

[0027] The protruding line 54 which encloses the periphery of each through tubes 42 and 50 over the perimeter in contact with the field where the up-and-down central shelves 34a and 36a counter is projected and formed in the front face of rubber membrane 32 at one, and the leakage of the fluid between the through tube 42 which adjoins under vibration of the large amplitude thereby especially with a low frequency, and 50 is prevented.

[0028] As mentioned above, with the vibration isolator of this becoming operation gestalt, the dimension X of the clearance 48 in which

rubber membrane 32 is held is prescribed by only the depth of the crevice 44 established in the top member 34. Therefore, the rigidity which forms with a metal about the bottom member 36, and bears caulking reinforcement is secured, and the dimensional accuracy of a movable clearance can be secured, without forming and carrying out cutting by resin about the top member 34.

[0029] In order only for the depth of the crevice 44 of the top member 34 to prescribe the movable clearance dimension of rubber membrane 32, the top member 34 and the bottom member 36 dash as the periphery section of the opening end face 46 of a crevice 44, and central shelf 36a, contact only in the section, and they consist of above-mentioned vibration isolators by other parts so that both may not contact. In this case, positioning with the top member 34 and the bottom member 36 is made by the inner skin of the tubed metallic ornaments 16 in the direction of a path, and the vibrationproofing base 14 level-difference section 14b Makes it solve in the height direction, and it is made between the sections.

[0030] And about a hand of cut, as shown in drawing 3 , it can position by extending the lower limit of the wall 56 in periphery section 34b of the top member 34. A wall 56 is intercepting the flow to a hoop direction in the lower limit section of the orifice passage 28, and is a wall for leading a liquid to the opening 52 of the bottom member 36. While positioning the top member 34 and the bottom member 36 in a hand of cut by extending the lower limit of this wall 56 caudad rather than the inferior surface of tongue of periphery section 34b, inserting this extension 58 in the opening 52 of the bottom member 36, and dashing against one opening edge, the opening area of opening 52 is securable.

[0031] Moreover, in the top member 34 and the bottom member 36, since [ of the opening end face 46 of a crevice 44, and the periphery section of central shelf 36a ] it dashed and was made to contact only in the section, as shown in drawing 2 (b), the clearance is secured between the lower limit of periphery section 34b of the top member 34, and inside step of bottom member 36 36c. Although leaking without intercepting completely the liquid which flows the orifice passage 28 by this clearance with a wall 56 is assumed, such leak can be prevented by having extended the lower limit of a wall 56 as mentioned above.

[0032] moreover, it is shown in drawing 3 (c) -- as -- the extension 58 of a wall 56 -- hook 60 -- preparing -- this hook 60 -- the opening edge of the opening 52 of the bottom member 36 -- you may hook -- thereby -- rotation prevention -- \*\* -- omission of the top member 34 at the time of manufacture and the bottom member 36 can be prevented.

[0033] Drawing 4 is the sectional view of the vibration isolator concerning other operation gestalten. Although resin is adopted like [ member / 34 / top ] the above-mentioned operation gestalt with this operation gestalt, it replaced with the press steel plate about the bottom member 36, and the aluminum cast is adopted.

[0034] Moreover, with this operation gestalt, slot 38b for forming the orifice passage 28 not only in the top member 34 but in the periphery section of the bottom member 36 is prepared. As shown in drawing 4 and 5, the top member 34 becomes a detail from periphery section 34b equipped with the above-mentioned central shelf 34a and slot 38a for forming upper passage 28a among the orifice passage 28 of 2 rounds of upper and lower sides. On the other hand, the bottom member 36 consists of periphery section 36b equipped with slot 38b for forming the above-mentioned central shelf 36a and lower passage 28b. The wall of the periphery section 36b top which makes the typeface of cross-section abbreviation KO forms upper passage 28a with periphery section 34b of the top member 34, a lower wall is installed by the method of outside, you make it go away 2nd fixing-metal 12, and caulking immobilization is carried out in the section.

[0035] Also with this operation gestalt, a crevice 44 is established in central shelf 36a of the top member 34, by dashing so that flat central shelf 36a of the bottom member 36 may close opening of this crevice 44, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed between the top member 34 and the bottom member 36, and the dimension X of this clearance 48 is specified by only the depth of a crevice 44.

[0036] Moreover, as shown in drawing 5 in this case as positioning in the hand of cut of the top member 34 and the bottom member 36, the lower limit of the wall 62 prepared in the top member 34 is extended. It is the wall established in order to lead a liquid to lower passage 28b from upper passage 28a, and this wall 62 extended the lower limit of this wall 62, it is inserting in the opening 66 for positioning which formed the extension 64 in periphery section 36b of the bottom member 36, and has positioned the top member 34 and the bottom member 36 in a hand of cut. Moreover, this has prevented leak of the liquid in the clearance between a wall 62 and periphery section 36b of the bottom member 36.

[0037] the effectiveness of the operation gestalt shown in above-mentioned drawing 1 with this operation gestalt -- in addition, since both the top member 34 and the bottom member 36 were used as mold mold goods, the effectiveness that a design degree of freedom is high is acquired.

[0038]

[Effect of the Invention] the dimension which regulates the variation rate of elastic membrane as it is the fluid filled system vibration isolator of this invention -- the part I material or the part II material -- since it can set up only by the side, the dimensional accuracy of the movable clearance between elastic membrane can be improved.

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the fluid filled system vibration isolator used for mainly supporting oscillating objects, such as an automobile engine, in vibrationproofing.

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PRIOR ART

[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine. The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphragm is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphragm, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphragm by the batch member. It is constituted so that it may make it come to be open for free passage of both \*\* with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.

[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.

[0004] What was constituted from a grid of a vertical pair and elastic membrane held between these grids in the French patent public presentation No. 2674590 official report as a batch member into which an up-and-down liquid room is divided is indicated. In this official report, in order to pinch the center section between up-and-down grids, to prepare elastic membrane so that a edge may float, and to prevent generating of the collision sound of elastic membrane and a grid, or the noise which is not desirable, the circular projection which counters a grid is prepared in one [ at least ] field of elastic membrane. This circular projection is equally arranged in the condition of having stood in a line in the shape of a ring on the surface of elastic membrane, and has the function which is gradually pressed by the grid and subsequently loosens elastically at the time of actuation of elastic membrane.

[0005] Moreover, although it is sequential in [ not elastic membrane but a grid ] include angle in order to prevent like the above generating of the collision sound of elastic membrane and a grid, or the noise which is not desirable to JP,6-221368,A, the technique of preparing the rib of the inhomogeneity which does not have a repeat in include angle over the whole surroundings of an axis is indicated.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] the dimension which regulates the variation rate of elastic membrane as it is the fluid filled system vibration isolator of this invention — the part I material or the part II material — since it can set up only by the side, the dimensional accuracy of the movable clearance between elastic membrane can be improved.

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TECHNICAL PROBLEM

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[Description of the Prior Art] The 1st fixing metal with which a fluid filled system vibration isolator is generally attached in an oscillating generating object side, such as an engine. The 2nd tubed fixing metal by which attachment immobilization is carried out at the support side of a car-body frame etc. Join together through the vibrationproofing base which consists of rubber material, and counter with a vibrationproofing base and diaphragm is allotted to the lower part side of the 2nd fixing metal of the above. Make a room into a fluid enclosure room among between a vibrationproofing base and diaphragm, and this fluid enclosure room is divided into two by the side of a vibrationproofing base and diaphragm by the batch member. It is constituted so that it may make it come to be open for free passage of both \*\* with an orifice and a periodic-damping function may be achieved according to the liquid convection effect between both the liquid rooms by the orifice, or the vibration-deadening effectiveness of a vibrationproofing base.

[0003] In this fluid filled system vibration isolator, what was constituted from elastic membrane as valve portion material which carries out reciprocation displacement of the batch member, and a grid-like member of the vertical pair which restricts a motion of this elastic membrane is well-known. Under vibration of the large amplitude with a low frequency like vibration resulting from the irregularity of the road surface at the time of car transit, the vibration isolator with such elastic membrane demonstrates a periodic-damping function because a fluid flows for two rooms through an orifice. On the other hand, under vibration of tiny vibration width of face with a high frequency like vibration resulting from an engine rotational frequency, the above-mentioned orifice does not function but demonstrates a periodic-damping function according to reciprocation deformation of elastic membrane.

[0004] About this kind of vibration isolator, what constituted the grid from an orifice member of the vertical pair which forms orifice passage in the periphery section in preparation for a center section, and elastic membrane held between both orifice members as a batch member into which an up-and-down liquid room is divided is indicated by JP,6-221368,A. In this vibration isolator, fitting of the orifice member which consists of the same ingredient was carried out, in order to set up orifice passage and the movable clearance between elastic membrane and to raise fitting precision, the fitting side had to be cut or dimensional accuracy of the movable clearance between elastic membrane had to be sacrificed. That is, when having set up the clearance dimension at the time of combining, therefore combining the large components of especially manufacture tolerance by each dimension setup in the orifice member of the upper and lower sides which fit in in this case, it was not easy to secure the dimensional accuracy of a movable clearance.

[0005] This invention is made in view of the above point, and aims at improving the dimensional accuracy of the movable clearance for the elastic membrane in a batch member.

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**MEANS**

[Means for Solving the Problem] The 2nd attachment member in which the fluid filled system vibration isolator of this invention has the 1st attachment member and a tubed drum section. The vibrationproofing base which consists of rubber material which is interposed between these attachment members and combines both the attachment member. The diaphram which was made to counter said vibrationproofing base and was attached in said 2nd attachment member. The fluid enclosure room prepared between the aforementioned vibrationproofing base and diaphram in the inside of said 2nd attachment member. The batch member which forms the orifice passage which it is attached [ passage ] in the inner circumference of said 2nd attachment member, and said fluid enclosure room is divided [ passage ] into the 1st room by the side of a vibrationproofing base, and the 2nd room by the side of diaphram, and makes the periphery section open the 1st room and the 2nd room for free passage. The elastic membrane into which a preparation and said batch member divide the 1st aforementioned room and the 2nd room. It comes to have the part I material allotted to the vibrationproofing base side about this elastic membrane, and the part II material which presses the periphery section of said part I material in the fluid enclosure room side periphery section of said vibrationproofing base by it being allotted to a diaphram side about said elastic membrane, and caulking immobilization of the periphery section being carried out at said 2nd attachment member. While preparing the crevice for holding said elastic membrane in the aforementioned part I material or the part II material, the flat-surface section which contacts an opening end face is prepared so that opening of this crevice may be plugged up on another side, and the clearance which restricts the variation rate of said elastic membrane between said part I material and part II material is formed.

[0007] The dimension is prescribed by the depth of the crevice which established the movable clearance for elastic membrane in the part I material or the part II material in the batch member which forms orifice passage in the periphery section as it is the vibration isolator of this invention. namely, the dimension which regulates the variation rate of elastic membrane -- the part I material or the part II material -- it can set up only by the side. Therefore, the dimensional accuracy of a movable clearance can be improved compared with the case where a dimension setup is carried out with both combination. Close dimensional accuracy is called for also about the movable clearance between elastic membrane by the advancement of the military requirement of the latest car, and if it is this invention, it can respond cheaply in simple combination to such a demand.

[0008] In the vibration isolator of this invention, the part I material and the part II material can be formed with a heterogeneous ingredient, and by establishing the above-mentioned crevice in the small member of manufacture tolerance in that case, while is accurate and they can set up a movable clearance only by the member.

[0009] For example, said crevice is established in said part I material, this part I material may be formed with resin, said flat-surface section may be prepared in said part II material, and this part II material may be formed with a metal. In this case, about the part II material which carries out caulking immobilization, the reinforcement which is equal to a caulking is securable by forming with metals, such as a press steel plate and an aluminum cast. On the other hand, the dimensional accuracy of a movable clearance can be secured about the part I material which performs a dimension setup of a movable clearance, without carrying out cutting by forming by resin with sufficient dimensional accuracy. Moreover, lightweight-ization can also be attained by forming by resin.

[0010] As for the part I material and the part II material, in the vibration isolator of this invention, constituting so that it may not contact fundamentally is desirable by parts other than the contact section of the above-mentioned flat-surface section and a crevice opening end face. However, in order to position both in a hand of cut, the part may touch.

[0011] For example, when the part I material equips the periphery section with the wall which intercepts the flow to the hoop direction of said orifice passage, the tip of this wall may be extended and you may insert in the hole which prepared this extension in the periphery section of said part II material. In this case, the part I material and the part II material can be positioned in a hand of cut by applying an extension to the opening edge of the above-mentioned hole. Moreover, since the wall is extended to the part II material side in this case, leak of a fluid [ \*\*\*\* / from between the tip of a wall and the part II material / un-] can also be prevented by this extension.

[0012] Moreover, a hook may be prepared in the extension of said wall, this hook may be hooked on the opening edge of said hole, and, thereby, omission prevention with the part I material and the part II material at the time of manufacture and rotation prevention are attained.

[0013]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing.

[0014] Drawing 1 is drawing of longitudinal section of the fluid filled system vibration isolator concerning 1 operation gestalt of this invention. This vibration isolator comes to join together the 1st fixing metal 10 attached in an oscillating generating object side, such as an engine, and the 2nd fixing metal 12 which has the tubed drum section by which attachment immobilization is carried out at the support side of a car-body frame etc. through the vibrationproofing base 14 which consists of rubber material.

[0015] The 2nd fixing metal 12 consists of tubed metallic ornaments 16 and bottom metallic ornaments 18 concluded by the lower limit 16a with the caulking means, and the bolt 19 for attachment protrudes on the bottom metallic ornaments 18.

[0016] The 1st fixing metal 10 is the plate-like part material which set necessary spacing to the axial center section upper part of the 2nd fixing metal 12, and was allotted to it, and the bolt 20 for attachment protrudes on the center section towards the upper part.

[0017] The 1st fixing metal 10 fixed [ the appearance ] the abbreviation truncated cone form with the vulcanization shaping means on nothing and its top face, and the upper limit section of the 2nd fixing metal 12 has fixed the vibrationproofing base 14 with the vulcanization shaping means in the lower limit periphery section. In the case of drawing, diameter expansion formation of the upper limit section 16b of the tubed metallic ornaments 16 is carried out at the shape of a taper, and vulcanization adhesion of the lower periphery of the vibrationproofing base 14 is carried out at this upper limit section 16b. Thin film rubber section 14a installed in the shape of a thin film from the vibrationproofing base 14 is prepared in the internal surface of the 2nd fixing metal 12.

[0018] The lower part side of the 2nd fixing metal 12 is equipped with the diaphram 22 which consists of rubber membrane so that it may counter with the vibrationproofing base 14. Diaphram 22 equips the periphery section with the ring-like reinforcement metallic ornaments 24, and it is attached in the 2nd fixing metal 12 by these reinforcement metallic ornaments 24 making it go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization being carried out at the section.

[0019] Inside the 2nd fixing metal 12, the fluid enclosure room 26 sealed between diaphram 22 and the vibrationproofing base 14 is formed.

and the liquid as a fluid is enclosed within this fluid enclosure room 26, the disc-like batch member 30 which has the orifice passage 28 at a periphery in the inner circumference. 2nd fixing metal 12 in the fluid enclosure room 26 — it is attached densely. The fluid enclosure room 26 is divided into 1st room 26a by the side of a vibrationproofing base, and 2nd room 26b by the side of diaphragm by this batch member 30, and both \*\* 26a and 26b are made open for free passage by the orifice passage 28.

[0020] The batch member 30 consists of the disc-like rubber membrane 32 as valve portion material which divides 1st room 26a and 2nd room 26b, a top member 34 allotted to the vibrationproofing base 14 side about rubber membrane 32, and a bottom member 36 allotted to the diaphragm 22 side about rubber membrane 32.

[0021] With this operation gestalt, the top member 34 is the mold Plastic solid of resin (for example, PPA (poly phthalamide)), and as shown in drawing 2 , it consists of central shelf 34a which is faced and allotted to the top face of rubber membrane 32, and restricts the variation rate to the upper part, and periphery section 34b equipped with the slot 38 for forming the orifice passage 28. Periphery section 34b makes approximate circle tubed, and is equipped with the slot 38 which extends over 2 rounds of upper and lower sides in a hoop direction in the peripheral face. And let space surrounded by this slot 38 and thin film rubber section 14a of the vibrationproofing base 14 be the orifice passage 28. The opening 40 which makes the orifice passage 28 and 1st room 26a open for free passage because some upper walls cut and lack is formed in periphery section 34b.

[0022] It is built over central shelf 34a of the top member 34 so that the interior of cylinder-like periphery section 34b may be divided up and down in a shaft-orientations center section, therefore it is making disc-like. Central shelf 34a is formed in the shape of a grid, and is equipped with two or more through tubes 42 formed of this grid. The crevice 44 for holding rubber membrane 32 is established in the field of the side which counters the inferior surface of tongue 32 of central shelf 34a, i.e., rubber membrane. The even opening end face 46 which makes the shape of a ring is secured in the perimeter of a crevice 44.

[0023] Disc-like central shelf 36a which the bottom member 36 is the press-forming object of a metal plate with this operation gestalt, is faced and allotted to the inferior surface of tongue of rubber membrane 32, and restricts the variation rate to the lower part. It consists of periphery section 36b by which is made to go away with the tubed metallic ornaments 16 and the bottom metallic ornaments 18, and caulking immobilization is carried out in the section, and while forming the orifice passage 28 with periphery section 34b of the top member 34 between central shelf 36a and periphery section 36b, step 36c is formed. The bottom member 36 is pressed by carrying out caulking immobilization of the periphery section 36b to level difference section 14b in which the upper limit side of periphery section 34b of the top member 34 was established by the bottom periphery section of the vibrationproofing base 14.

[0024] Central shelf 36a of the bottom member 36 is projected and prepared in the upper part from inside step 36c, and it is allotted inside [ lower ] periphery section 34b so that phase opposite may be carried out with central shelf 34a of the top member 34. Central shelf 36a of the bottom member 36 is the flat-surface section which contacts the opening end face 46 so that opening of the crevice 44 of the top member 34 may be plugged up, and it does not have a crevice for holding rubber membrane 32 like the top member 34. Therefore, by pressing central shelf 36a of the bottom member 36 to the opening end face 46 of the crevice 44 of the top member 34 by the above-mentioned caulking immobilization, as shown in drawing 2 (c), between the top member 34 and the bottom member 36, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed, and the dimension X of this clearance 48 is prescribed by only the depth of a crevice 44.

[0025] In addition, central shelf 36a of a bottom member is formed in the shape of [ the / as central shelf 34a of the top member 34 / same ] a grid, and is equipped with two or more through tubes 50 formed of this grid. Moreover, the opening 52 which makes the orifice passage 28 and 2nd room 26b open for free passage is formed in inside step of bottom member 36 36c.

[0026] Rubber membrane 32 is allotted to the above-mentioned clearance 48, and the variation rate of the vertical direction is restricted between up-and-down central shelf 34a and 36a. the dimension X of a clearance 48 is greatly set up a little rather than the thickness of rubber membrane 32 — having — \*\*\*\* — thereby — vertical movement of rubber membrane 32 — the variation rate is made possible.

[0027] The protruding line 54 which encloses the periphery of each through tubes 42 and 50 over the perimeter in contact with the field where the up-and-down central shelves 34a and 36a counter is projected and formed in the front face of rubber membrane 32 at one, and the leakage of the fluid between the through tube 42 which adjoins under vibration of the large amplitude thereby especially with a low frequency, and 50 is prevented.

[0028] As mentioned above, with the vibration isolator of this becoming operation gestalt, the dimension X of the clearance 48 in which rubber membrane 32 is held is prescribed by only the depth of the crevice 44 established in the top member 34. Therefore, the rigidity which forms with a metal about the bottom member 36, and bears caulking reinforcement is securable, and the dimensional accuracy of a movable clearance can be secured, without forming and carrying out cutting by resin about the top member 34.

[0029] In order only for the depth of the crevice 44 of the top member 34 to prescribe the movable clearance dimension of rubber membrane 32, the top member 34 and the bottom member 36 dash as the periphery section of the opening end face 46 of a crevice 44, and central shelf 36a, contact only in the section, and they consist of above-mentioned vibration isolators by other parts so that both may not contact. In this case, positioning with the top member 34 and the bottom member 36 is made by the inner skin of the tubed metallic ornaments 16 in the direction of a path, and the vibrationproofing base 14 level-difference section 14b Makes it solve in the height direction, and it is made between the sections.

[0030] And about a hand of cut, as shown in drawing 3 , it can position by extending the lower limit of the wall 56 in periphery section 34b of the top member 34. A wall 56 is intercepting the flow to a hoop direction in the lower limit section of the orifice passage 28, and is a wall for leading a liquid to the opening 52 of the bottom member 36. While positioning the top member 34 and the bottom member 36 in a hand of cut by extending the lower limit of this wall 56 caudad rather than the inferior surface of tongue of periphery section 34b, inserting this extension 58 in the opening 52 of the bottom member 36, and dashing against one opening edge, the opening area of opening 52 is securable.

[0031] Moreover, in the top member 34 and the bottom member 36, since [ of the opening end face 46 of a crevice 44, and the periphery section of central shelf 36a ] it dashed and was made to contact only in the section, as shown in drawing 2 (b), the clearance is secured between the lower limit of periphery section 34b of the top member 34, and inside step of bottom member 36 36c. Although leaking without intercepting completely the liquid which flows the orifice passage 28 by this clearance with a wall 56 is assumed, such leak can be prevented by having extended the lower limit of a wall 56 as mentioned above.

[0032] moreover, it is shown in drawing 3 (c) — as — the extension 58 of a wall 56 — hook 60 — preparing — this hook 60 — the opening edge of the opening 52 of the bottom member 36 — you may hook — thereby — rotation prevention — \*\* — omission of the top member 34 at the time of manufacture and the bottom member 36 can be prevented.

[0033] Drawing 4 is the sectional view of the vibration isolator concerning other operation gestalten. Although resin is adopted like [ member / 34 / top ] the above-mentioned operation gestalt with this operation gestalt, it replaced with the press steel plate about the bottom member 36, and the aluminum cast is adopted.

[0034] Moreover, with this operation gestalt, slot 38b for forming the orifice passage 28 not only in the top member 34 but in the periphery section of the bottom member 36 is prepared. As shown in drawing 4 and 5, the top member 34 becomes a detail from periphery section 34b equipped with the above-mentioned central shelf 34a and slot 38a for forming upper passage 28a among the orifice passage 28 of 2 rounds of upper and lower sides. On the other hand, the bottom member 36 consists of periphery section 36b equipped with slot 38b for forming the above-mentioned central shelf 36a and lower passage 28b. The wall of the periphery section 36b top which makes the typeface

of cross-section abbreviation KO form upper passage 28a with periphery section 34b of the top member 34, a lower wall is installed by the method of outside, you make it go 2nd fixing-metal 12, and caulking immobilization is carried out in the section.

[0035] Also with this operation gestalt, a crevice 44 is established in central shelf 36a of the top member 34, by dashing so that flat central shelf 36a of the bottom member 36 may close opening of this crevice 44, the clearance 48 which restricts the variation rate of rubber membrane 32 is formed between the top member 34 and the bottom member 36, and the dimension X of this clearance 48 is specified by only the depth of a crevice 44.

[0036] Moreover, as shown in drawing 5 in this case as positioning in the hand of cut of the top member 34 and the bottom member 36, the lower limit of the wall 62 prepared in the top member 34 is extended. It is the wall established in order to lead a liquid to lower passage 28b from upper passage 28a, and this wall 62 extended the lower limit of this wall 62, it is inserting in the opening 66 for positioning which formed the extension 64 in periphery section 36b of the bottom member 36, and has positioned the top member 34 and the bottom member 36 in a hand of cut. Moreover, this has prevented leak of the liquid in the clearance between a wall 62 and periphery section 36b of the bottom member 36.

[0037] the effectiveness of the operation gestalt shown in above-mentioned drawing 1 with this operation gestalt — in addition, since both the top member 34 and the bottom member 36 were used as mold mold goods, the effectiveness that a design degree of freedom is high is acquired.

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[Translation done.]

## \* NOTICES \*

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## DESCRIPTION OF DRAWINGS

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**[Brief Description of the Drawings]**

[Drawing 1] It is drawing of longitudinal section of the vibration isolator concerning 1 operation gestalt of this invention.  
[Drawing 2] The sectional view in the combination condition and (c of the sectional view which (a) decomposes the batch member in this operation gestalt, and is shown, and (b)) are the A section enlarged drawings of (b).  
[Drawing 3] The side elevation of a batch member and (c of the side elevation of a top member [ in / in (a) / this operation gestalt ] and (b)) are the B section enlarged drawings of (b).  
[Drawing 4] It is the sectional view of the vibration isolator concerning other operation gestalten.  
[Drawing 5] the side elevation decomposing and showing the batch member which (a) requires for other operation gestalten, and (b) -- it is a side elevation in the attachment condition.

**[Description of Notations]**

- 10 .... The 1st fixing metal
- 12 .... The 2nd fixing metal
- 14 .... Vibrationproofing base
- 22 .... Diaphragm
- 26 .... Fluid enclosure room
- 28 .... Orifice
- 30 .... Batch member
- 32 .... Rubber membrane
- 34 .... Top member
- 36 .... Bottom member
- 36a .... Central shelf
- 44 .... Crevice
- 48 .... Opening end face
- 48 .... Wall
- 58 64 .... Extension
- 52 66 .... Opening
- 60 .... Hook

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[Translation done.]

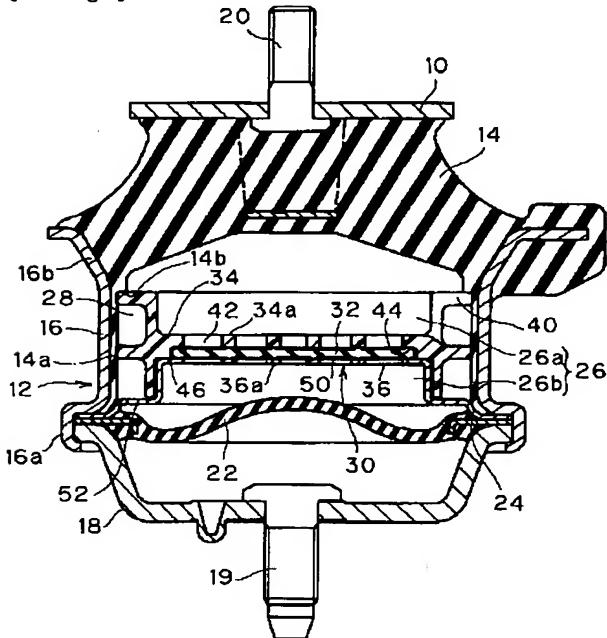
## \* NOTICES \*

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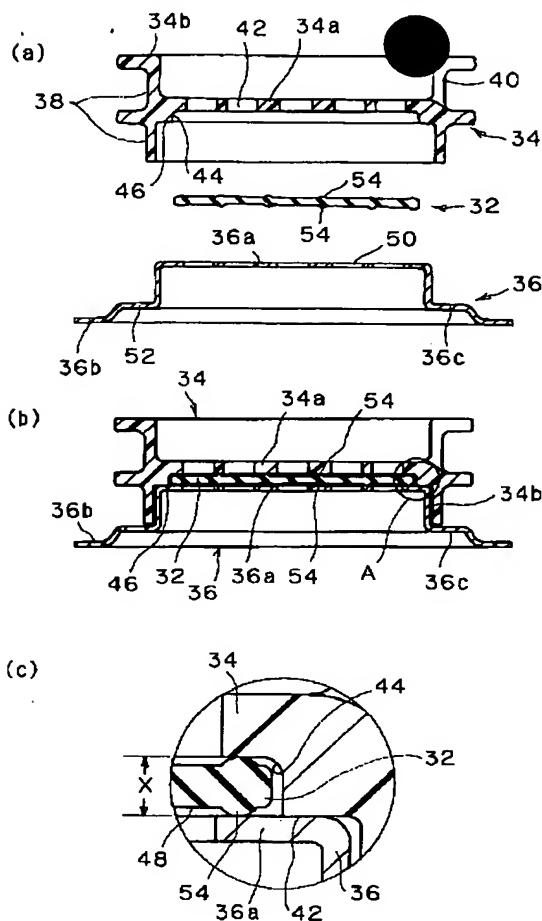
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## DRAWINGS

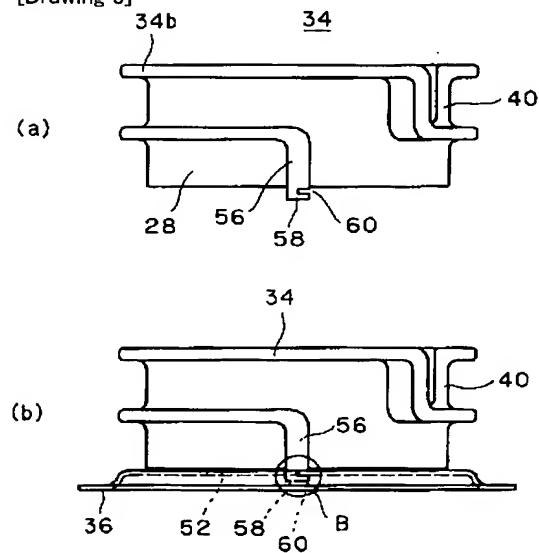
[Drawing 1]



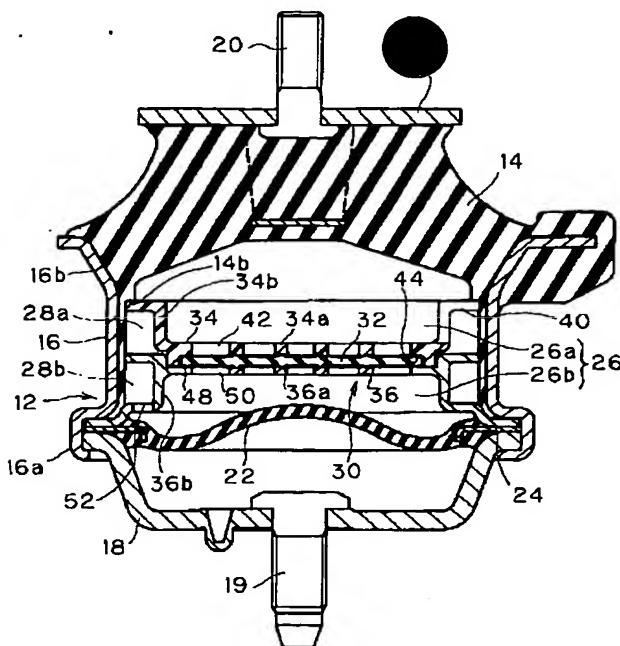
[Drawing 2]



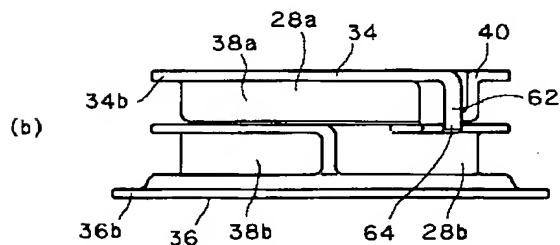
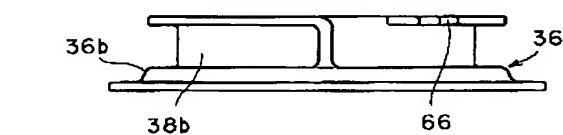
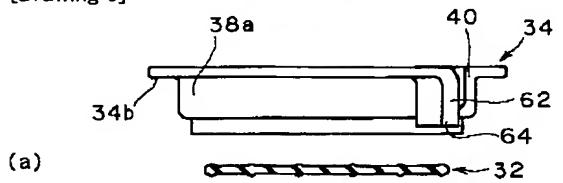
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]

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## 【特許請求の範囲】

【請求項1】第1取付部材と、第2取付部材と、これら取付部材の間に介設されて両取付部材を結合するゴム材よりなる防振基体と、前記防振基体に対向させて前記第2取付部材に取り付けたダイヤフラムと、前記の防振基体とダイヤフラムとの間に設けられた流体封入室と、前記流体封入室を防振基体側の第1室とダイヤフラム側の第2室とに仕切る仕切部材と、前記の第1室と第2室を連通させるオリフィスと、を備え、

前記仕切部材が、前記の第1室と第2室を仕切る弾性膜と、該弾性膜の変位を制限する一対の格子とを備えてなり、

前記弾性膜の表面とこれに對向する前記格子の面との間に、該格子により形成される各貫通孔を周間にわたって取り囲み隣接する貫通孔間での流体の移動を規制する凸条を設けたことを特徴とする流体封入式防振装置。

【請求項2】前記凸条が、前記弾性膜の表面又はこれに對向する前記格子の面に一体に設けられたことを特徴とする請求項1記載の流体封入式防振装置。

【請求項3】前記格子が、周方向に延びる複数の環状部と、半径方向に延びて前記複数の環状部を連結する連結部とからなり、該格子により周方向に複数の貫通孔を配置してなる貫通孔列が2列以上設けられ、ここで、前記連結部は前記格子の内周側と外周側とで異なるピッチで配されており、

前記凸条が、前記弾性膜に設けられており、前記格子の前記環状部に對応して周方向に延びる複数の環状凸部と、前記格子の前記連結部に對応して放射状に延びる複数の放射状凸部とからなり、

前記放射状凸部は、前記弾性膜の半径方向の略全長にわたって、かつ、均等な角度で放射状に延びていることを特徴とする請求項1又は2記載の流体封入式防振装置。

【請求項4】前記弾性膜に位置決め用凸部を設けるとともに、前記格子に該凸部が嵌合する位置決め用凹部を設けて、両者を嵌合させることで前記弾性膜を回転方向で位置決めしたことを特徴とする請求項3記載の流体封入式防振装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、主として自動車エンジン等の振動体を防振的に支承するのに用いられる流体封入式防振装置に関するものである。

## 【0002】

【従来の技術】一般に、流体封入式防振装置は、エンジン等の振動発生体側に取り付けられる第1取付金具と、車体フレーム等の支持側に取付固定される筒状の第2取付金具とを、ゴム材よりなる防振基体を介して結合し、上記第2取付金具の下部側に防振基体と対向してダイヤフラムを配し、防振基体とダイヤフラムとの間の内室を流体封入室とし、この流体封入室を仕切部材により防振

基体側とダイヤフラム側との2室に仕切り、両室をオリフィスにより連通せしめてなり、オリフィスによる両液室間の液流动効果や防振基体の制振効果により、振動減衰機能を果たすように構成されている。

【0003】かかる流体封入式防振装置において、仕切部材を、往復動変位する弁部材としての弾性膜と、該弾性膜の動きを制限する上下一対の格子とで構成したものが公知である。このような弾性膜を持つ防振装置は、車両走行時の路面の凹凸に起因する振動のような周波数の低い大振幅の振動下では、流体がオリフィスを通って2室間を流动することで振動減衰機能を發揮する。一方、エンジンの回転数に起因する振動のような周波数の高い微振幅の振動下では、上記オリフィスは機能せず、弾性膜の往復動変形により振動減衰機能を發揮する。

【0004】フランス国特許公開第2674590号公報には、上下の液室を仕切る仕切部材として、上下一対の格子と、該格子間に保持された弾性膜とで構成したものが開示されている。同公報では、弾性膜は、その中央部が上下の格子間に挟持され、縁部が浮動するように設けられており、弾性膜と格子との衝突音や望ましくない騒音の発生を防止するため、弾性膜の少なくとも一方の面には格子に對向する円形突起が設けられている。この円形突起は、弾性膜の表面にリング状に並んだ状態で均等に配置されており、弾性膜の作動時に、格子に段階的に押圧され次いで弾性的に弛緩する機能を持っている。

【0005】また、特開平6-221368号公報には、上記と同様に弾性膜と格子との衝突音や望ましくない騒音の発生を防止するため、弾性膜ではなく格子に、角度的には順次であるが、軸線の回り全体にわたって角度的に繰り返しのない不均等性のリブを設ける技術が開示されている。

## 【0006】

【発明が解決しようとする課題】上記従来技術の円形突起やリブは、弾性膜が上下に変位することで格子に衝突する際の衝撃音を軽減するために設けられたものであり、格子により形成される貫通孔間において、周方向や半径方向での封入液の移動を制限するものではない。そのため、上記従来の防振装置では、周波数の低い大振幅の振動下において、隣接する貫通孔間で封入液の移動

(リーク) が起こり、より高い性能を發揮し難い。

【0007】本発明は、このような点に鑑みてなされたものであり、仕切部材の貫通孔における封入流体の不必要的リークを防止して、防振性能を向上すること目的とする。

## 【0008】

【課題を解決するための手段】本発明の流体封入式防振装置は、第1取付部材と、第2取付部材と、これら取付部材の間に介設されて両取付部材を結合するゴム材よりなる防振基体と、前記防振基体に対向させて前記第2取付部材に取り付けたダイヤフラムと、前記の防振基体と

ダイヤフラムとの間に設けられた流体封入室と、前記流体封入室を防振基体側の第1室とダイヤフラム側の第2室とに仕切る仕切部材と、前記の第1室と第2室を連通させるオリフィスと、を備え、前記仕切部材が、前記の第1室と第2室を仕切る弹性膜と、該弹性膜の変位を制限する一対の格子とを備えてなり、前記弹性膜の表面とこれに対向する前記格子の面との間に、該格子により形成される各貫通孔を全周にわたって取り囲み隣接する貫通孔間での流体の移動を規制する凸条を設けたものである。

【0009】本発明の流体封入式防振装置では、弹性膜とこれに対向する格子との間に各貫通孔を全周にわたって取り囲む凸条を設けたことにより、特に周波数の低い大振幅の振動下において上記凸条が隣接する貫通孔間での流体の漏れを防止する。そのため、弹性膜を各貫通孔ごとに撓ませることができ、高いロスファクターが得られる。また、周波数の高い微振幅の振動下では、流体が上記凸条を越えて移動するようにしてもよく、その場合、凸条を越えて移動する流体が液圧差を緩和して低動ばね定数を發揮する。

【0010】上記凸条は、弹性膜の表面又はこれに対向する格子の面に一体に設けることができる。

【0011】より具体的には、前記格子が、周方向に延びる複数の環状部と、半径方向に延びて前記複数の環状部を連結する連結部とからなり、該格子により周方向に複数の貫通孔を配置してなる貫通孔列が2列以上設けられ、ここで、前記連結部は前記格子の内周側と外周側とで異なるピッチで配されており、前記凸条が、前記弹性膜に設けられており、前記格子の前記環状部に対応して周方向に延びる複数の環状凸部と、前記格子の前記連結部に対応して放射状に延びる複数の放射状凸部とからなり、前記放射状凸部は、前記弹性膜の半径方向の略全長にわたって、かつ、均等な角度で放射状に延びている場合がある。この場合、放射状凸部の中には格子の連結部上に載らないものもあるが、このように格子から外れた凸条であっても弹性膜の各貫通孔ごとの撓み挙動を妨げることはない。そのため、弹性膜の軸線回りで均等に配置した凸条でも機能に支障を与えない。

【0012】弹性膜に上記凸条を設ける場合、弹性膜に位置決め用凸部を設けるとともに、前記格子に該凸部が嵌合する位置決め用凹部を設けて、両者を嵌合させることで前記弹性膜を回転方向で位置決めてもよい。これにより、弹性膜に設けた放射状凸部を格子の連結部上に確実に載せることができる。

### 【0013】

【発明の実施の形態】以下、本発明の実施形態を図面を参照して説明する。

【0014】図1は本発明の1実施形態に係る流体封入式防振装置の縦断面図、図2はその分解図である。この防振装置は、エンジン等の振動発生体側に取り付けられ

る第1取付金具10と、車体フレーム等の支持側に取付固定される筒状の第2取付金具12とを、ゴム材よりなる防振基体14を介して結合してなる。

【0015】第2取付金具12は、筒状金具16と、その下端16aにかしめ手段により締結された底金具18とからなり、底金具18に取付用ボルト19が突設されている。

【0016】第1取付金具10は、第2取付金具12の軸心部上方に所要の間隔をおいて配された板状部材であり、その中央部に取付用ボルト20が上方に向けて突設されている。

【0017】防振基体14は、外形が略截頭円錐形をなし、その上面に第1取付金具10が加硫成形手段により固着され、下端外周部に第2取付金具12の上端部が加硫成形手段により固着されている。図の場合、筒状金具16の上端部16bがテーパ状に拡径形成されており、該上端部16bに防振基体14の下部外周が加硫接着されている。第2取付金具12の内壁面には、防振基体14から薄膜状に延設された薄膜ゴム部14aが設けられている。

【0018】第2取付金具12の下部側には、防振基体14と対向するようにゴム膜よりなるダイヤフラム22が装着されている。ダイヤフラム22は、外周部にリング状の補強金具24を備え、この補強金具24が筒状金具16と底金具18とのかしめ部にかしめ固定されることで第2取付金具12に取り付けられている。

【0019】第2取付金具12の内側には、ダイヤフラム22と防振基体14との間に密閉された流体封入室26が形成されており、この流体封入室26に流体としての液体が封入されている。流体封入室26における第2取付金具12の内側には、外周にオリフィス28を有する円盤状の仕切部材30が液密に嵌着されている。流体封入室26は、この仕切部材30により防振基体側の第1室26aとダイヤフラム側の第2室26bとに仕切られており、両室26a, 26bがオリフィス28により連通せしめられている。

【0020】仕切部材30は、第1室26aと第2室26bとを仕切る弁部材としての円板状のゴム膜32と、外周にオリフィス28を形成するための溝34を備えるオリフィス部材36と、オリフィス部材36の外周縁部を防振基体14側に押圧する仕切板38とで構成されている。

【0021】オリフィス部材36は、金属又は樹脂のモールド成形体であって、外周面には周方向に上下2周にわたって延びる溝34が形成されている。この溝34と防振基体14の薄膜ゴム部14aとで囲まれた空間がオリフィス28とされている。

【0022】仕切板38は、金属板のプレス成形体であって、上方に突出した円板状の中央棚部38aを備える。仕切板38は、外周縁部38bが筒状金具16と底

金具18とのかしめ部にかしめ固定されることで第2取付金具12を取り付けられている。

【0023】オリフィス部材36と仕切板38には、オリフィス28を第1室26aと第2室26bに連通させるための開口37、39がそれぞれ設けられている。

【0024】オリフィス部材36と仕切板38にはそれぞれ中央部に、ゴム膜32の上下方向の変位を制限する外形が円形の格子40、42が設けられている。ゴム膜32は、第1室26aに面したオリフィス部材36の格子40と第2室26bに面した仕切板38の格子42との間で形成される隙間(収容空間)44内に配されて、両格子40、42間でその変位が制限される。隙間44の寸法(高さ)は、ゴム膜32の厚みよりも若干大きく設定されており、これにより、ゴム膜32の上下動変位を可能にしている。

【0025】両格子40、42は同一の格子形状を持っている。図4に示すように、仕切板38の中央棚部38aに設けられた格子42は、周方向に延びる3本の同心状の環状部42aと、半径方向に延びて隣接する2つの環状部間を連結する連結部42bとからなる。連結部42bは、格子42の内周側と外周側とで異なるピッチで配されており、図の場合、内周側の連結部42bは90°間隔で4本、外周側の連結部42bは45°間隔で8本設けられている。また、内周側の連結部42bと外周側の連結部42bとが全て一致しないように、両者は位相を22.5°ずらして設けられている。この格子42により、周方向に複数の長穴状の貫通孔46を配置してなる貫通孔列が内周側と外周側との2列に設けられるが、上記のように連結部42bのピッチを変えたことにより、貫通孔46は内周側で4個、外周側で8個が設けられる。このように内周側で貫通孔46の数を少なくすることで、内周側の各貫通孔46の開口面積を、外周側と同程度に、大きく確保することができる。オリフィス部材36の格子40も上記した仕切板38の格子42と同一形状であり、かつ、両者36、38は互いの貫通孔46が一致した位置に配されるように組付けられる。

【0026】ゴム膜32の表面には、上記格子40、42の対向する面に当接して各貫通孔46の外周を全周にわたって取り囲む凸条48が一体に突出形成されている。凸条48は、図3に示すように、ゴム膜32の上下両面に同一形状にて設けられている。具体的には、図4に示すように、凸条48は、格子42の環状部42aに対応して周方向に延びる3本の同心状の環状凸部48aと、格子42の連結部42bに対応して放射状に延びる放射状凸部48bとからなる。この放射状凸部48bは、ゴム膜32の中心から半径方向の略全長にわたって延びている。また、放射状凸部48bは、格子42の全ての連結部42bに少なくとも1本が載るように、かつ、均等な角度で放射状の延びるように、22.5°間隔で設けられている。

【0027】以上よりなる本実施形態の防振装置であると、周波数の低い大振幅(例えば±0.3mm以上)の振動下では、流体がオリフィス28を通って2室26a、26b間を流動することにより振動減衰機能が発揮される。また、ゴム膜32に設けた凸条48が相対する格子40、42の支承面に当接することにより、周方向又は半径方向に隣接する貫通孔46間での流体の漏れが防止される。そのため、ゴム膜32を各貫通孔46ごとに撓ませることができ、高いロスファクターが得られる。一方、周波数の高い微振幅(例えば±0.1mm以下)の振動下では、上記オリフィス28は機能せず、凸条48を越えて移動する流体により第1室26aと第2室26bとの液圧差が緩和されて低動ばね定数が発揮される。このように本実施形態の防振装置であると、振幅依存性をなくしつつ高いロスファクターと低動ばね定数を達成することができ、異なる振幅下において十分な性能を発揮させることができる。

【0028】なお、格子40、42の連結部の配設ピッチを内周側と外周側で変えたことにより、軸線回りに均等に配設した放射状凸部48bでは、格子40、42の連結部上に載らないものも存在する。但し、このように格子40、42から外れた凸条48であってもゴム膜32の各貫通孔46ごとの撓み挙動を妨げることはないため、上記した性能に支障を与えない。

【0029】図5は、上記実施形態にゴム膜32の回転方向での位置決めのための構成を追加した例を示したものである。すなわち、この例では、ゴム膜32は、仕切板38側に突出する楕円形状の位置決め用凸部50を備える。該凸部50はゴム膜32の中央部に設けられている。また、仕切板38は、中央棚部38aの中心に上記凸部50が嵌合する位置決め用凹部52を備える。該凹部52は、この実施形態では凸部50の外形形状に対応する長孔からなる。

【0030】この場合、ゴム膜32を仕切板38上に組付ける際に、ゴム膜32の凸部50を仕切板38の凹部52に嵌合させながら、ゴム膜32を仕切板38の格子42上に載せることにより、ゴム膜32に設けた放射状凸部48bを格子42の連結部42b上に確実に載せることができる。

【0031】なお、凸部50及び凹部52の形状は、回転方向での位置決めが可能であれば上記した楕円形には限定されず、多角形状など種々の形状を採用することができる。また、位置決め用凸部と凹部を2つずつ設けて2組の嵌合により位置決めしてもよい。

【0032】以上の実施形態では、ゴム膜32に凸条48を設けたが、凸条は格子40、42に一体に設けてもよい。この場合、格子40、42に設けた凸条がゴム膜32に当接することで隣接する貫通孔46間での流体の漏れが防止される。

【0033】

【発明の効果】本発明の流体封入式防振装置であると、弾性膜とこれに対向する格子との間に各貫通孔を全周にわたって取り囲む凸条を設けたことにより、特に周波数の低い大振幅の振動下において隣接する貫通孔間での流体の漏れを防止することでき、防振性能を向上することができる。

【図面の簡単な説明】

【図1】本発明の1実施形態に係る防振装置の縦断面図である。

【図2】同防振装置を分解して示す断面図である。

【図3】図2のA部拡大図である。

【図4】(a)は仕切板の斜視図、(b)はゴム膜の斜視図、(c)は仕切板とゴム膜を組み合わせた状態での平面図である。

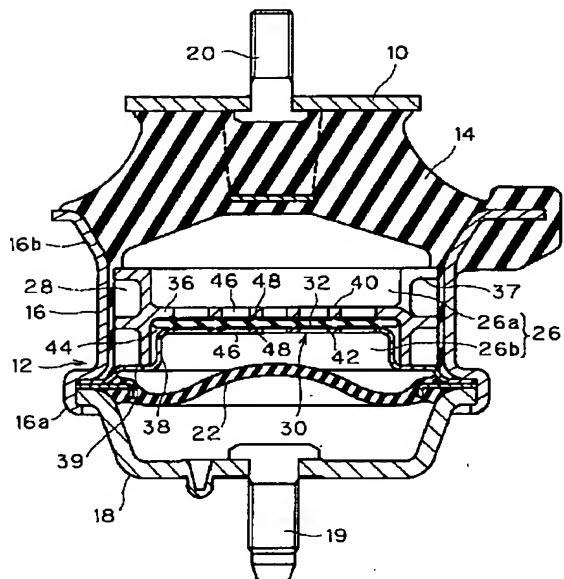
【図5】(a)は他の実施形態における仕切板とゴム膜を組み合わせた状態での平面図、(b)はそのB-B断

面図である。

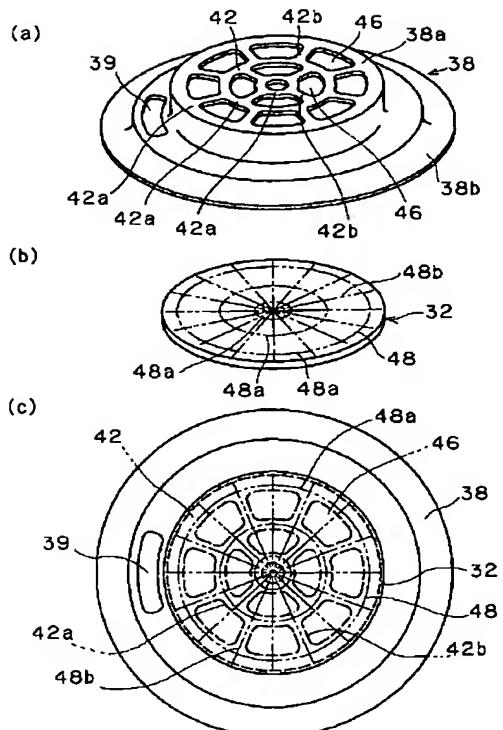
【符号の説明】

- 10 ……第1取付金具
- 12 ……第2取付金具
- 14 ……防振基体
- 22 ……ダイヤフラム
- 26 ……流体封入室
- 28 ……オリフィス
- 30 ……仕切部材
- 32 ……ゴム膜
- 40, 42 ……格子
- 42a ……環状部
- 42b ……連結部
- 48 ……凸条
- 48a ……環状凸部
- 48b ……放射状凸部

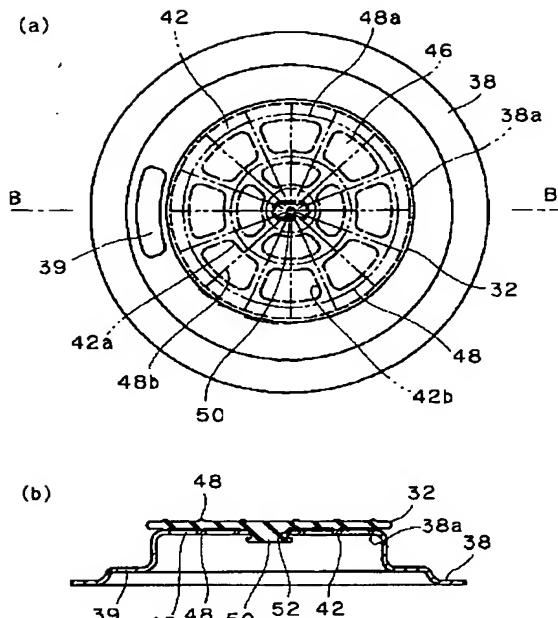
【図1】



【图 4】



【図5】



## フロントページの続き

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